

## **A Jetting Fluidized-Bed with a Partitioned Distributor and Double Horizontal Nozzles**

The present invention relates to a gas-solid fluidized-bed reactor, especially to a  
5 jetting fluidized bed reactor.

A jetting fluidized bed reactor in the prior art generally comprises a single  
horizontal nozzle, through which the reaction gas enters into the fluidized-bed reactor.  
Because of the existence of the horizontal jet, three regions are formed in the horizontal  
10 jetting fluidized bed: a jetting region, a bubbling region, and a dense-phase particle  
compression region. The region above the horizontal nozzle within the jetting depth is  
defined as a jetting region, which is a gas-solid reaction area; the region above the  
horizontal nozzle due to the jet being collapsed into bubbles (further than the jetting  
depth) is defined as a bubbling region; and the region below the horizontal nozzle is a  
15 dense phase particle compression region. Due to the suction effect of the jet, the particle  
density in the dense phase compression particle region is far greater than that in the  
emulsion-phase region. Since the particles are in a state of rest in the dense phase  
compression particle region, the reaction heat can not be transferred promptly, and the  
particles are prone to sinter in this region. With the local sintering range further  
20 expanded, the non-fluidized region in the bed would enlarge rapidly, which could lead  
to the reactor difficult to operate or even operation termination. Jet flow phenomenon  
occurs in many orifices in a distributor, bubbles generate after the jet is collapsed, small  
bubbles coalesce into large bobbles at a certain height above the distributor. The large  
bubbles will disturb the main jet to cause the main jet fluctuate strongly and the solid  
25 particles can not circulate well in the bed.

On account of the disadvantages in the art, an object of the present invention is to provide a fluidized-bed with partitioned distributor and double nozzles, which can not only avoid the local agglomeration of the particles and the operation termination accident effectively, but also broaden the operation range of the jet velocity and the pre-distribution fluidization velocity. Therefore, the non-fluidized phenomenon is eliminated effectively and a favorable circulation of the solid particles forms in the bed.

The object and task of present invention is achieved by the following technical concept. A fluidized-bed is composed of a jetting bed, a horizontal nozzle located at a side wall of the jetting fluidized bed, a gas distributor, a plenum chamber, and a cyclone, wherein an inclined nozzle is fixed at the side wall of the jetting bed above the gas distributor. The partition gas distributor consists of a combined gas distributor and a perforated gas distributor. The gas pre-distribution chamber is separated by a partition plate whose position can be adjusted according to industrial design requirements.

To avoid the coalescence of the bubbles (after jet being collapsed) and the fluctuation of the main jet, a combined gas distributor includes three layers: one is a perforated distributor, and the other two are an anticorrosion fiber cloth and a stainless steel mesh respectively.

Fig. 1 is a schematic view of the structure of the invention.

Now the principle, structure and the best embodiment of the invention will be explained in conjunction with the drawing.

As shown in the figure 1, the present invention mainly comprises a jetting fluidized-bed 1, a horizontal jetpipe 2, an inclined nozzle 3, a gas pre-distribution chamber with a combined gas distributor, 5, a partition plate 7, a gas pre-distribution

chamber with a perforated distributor, 9, and a cyclone, 11. The inclined nozzle 3 is inclined upwardly, and its inclination angle, diameter, length within the jetting fluidized bed and jet velocity should be adjusted and controlled according to the condition of the main nozzle and its main jet gas volume. The inclined jet flow do not disturb the main jet flow and will be absorbed into the main jet flow after entering into the main jetting region, it. Since the inclination jet region includes the dense-phase particle compression region, the inclined jet flow could make the dense-phase particle compression region disappear. Therefore, the local agglomeration phenomenon of the particles in the jetting bed can be avoided, and the serious operation termination accident can be prevented.

The diameters of the horizontal nozzle and the inclined nozzle as mentioned above are unequal, the length of the two nozzles within the jetting bed and the inclination angle of the inclined nozzle should be determined according to the operation requirements. In detail, the ratio of the horizontal nozzle diameter to the inclined nozzle diameter is in the range of  $1/5 \sim 1/3$ . The upward inclination angle of the inclined nozzle (with relation to the vertical wall) is in the range of  $25^{\circ} \sim 55^{\circ}$ .

As jets occur in orifices of the gas distributor and the flow will coalesce into large bubbles at a certain height above the distributor, the main jet flow (horizontal jet) fluctuates strongly. Therefore, the gas pre-distribution chamber with gas distributor is partitioned into two gas chambers, i.e. a gas pre-distribution chamber with a combined gas distributor 5 and a gas pre-distribution chamber with a perforated gas distributor 9 are partitioned by a partition plate 7. Said two gas pre-distribution chambers are provided with a gas inlet 6 and a gas inlet 8 respectively. To avoid large bubbles formed at the distributor to disturb the horizontal jet, a combined gas distributor 4 being consisted of three layers is employed in the bed: one is a perforated distributor, and the other two are an anticorrosion fiber cloth and a stainless steel mesh respectively. The

perforated gas distributor, which is positioned in the bubble generation region with horizontal jet flow, utilizes a perforated gas distributor 10. The gas volume in the two corresponding pre-distribution chambers can be adjusted independently and effectively to ensure solid particles circulating well in the jetting fluidized bed. A cyclone 11 is positioned above the bed. The resultant gas enters into the post-processor through a gas outlet 12.

The following advantageous improvement can be obtained from present invention in comparison with the prior art: the inclined nozzle can eliminate the dense-phase particle compression region and avoid the local agglomeration of the particles and the operation termination accident. Furthermore, since the adjustable range of the jet gas velocity and the pre-distribution fluidization velocity is broadened due to the partitioned gas distributor, the solid particles can circulate well in the bed.